Notebook, N-87-11-15

This notebook covers the period November 1887-September 1888. All entries are by Edison. At the beginning of the book is a 10-page draft letter outlining plans for the new West Orange laboratory to James Hood Wright, a partner in the investment banking firm of Drexel, Morgan & Co. and a director of the Edison Electric Light Co. Most of the book contains notes and drawings relating to projects planned for the new laboratory. Included are entries concerning photography, lamp filament, and phonograph cylinder experiments; improvements in the telephone transmitter; and the production of diamonds by chemical means. There are also hypotheses regarding electrical and chemical properties to be tested. Next to each entry is the name of the associate or assistant to whom Edison intended to assign the project, including John Ott, Charles Batchelor, William K. L. Dickson, Arthur E. Kennelly, Martin Force, Franz Schulze-Berge, H. De Coursey Hamilton, John English, and D. T. Marshall. At the end of the book are notes, drawings, and calculations pertaining to hydroelectric power production at Niagara Falls. The book contains 247 numbered pages.

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XE172
N-87115 ½
~~87115~~
870705

Mr. Wright -

My laboratory will soon be completed - The dimensions are one building 250 ft long 50 wide & 3 stories. 4 other bldgs 25 - X 150. one story high all of brick - I will have the best equipped & largest laboratory extant, and the facilities incomparably superior to any other for rapid working development of an invention, & working it up into commercial shape with models patterns & special machinery - In fact there is no similar institution in Existence We do our own castings forgings. Can build anything from a ladyes watch to a locomotive.

The Machine shop is sufficiently large to employ 50 men + 30 men can be worked in the other parts of the works – Inventions that formerly ~~cost me~~ to ~~[illegible]~~ cost a large sum can now be done ~~in days~~ 2 or 3 days with very small expense, as I shall carry a stock of almost every conceivable material of every size and with the latest machinery a man will produce 10 times as much as in a lathe ~~with~~ which has but little material not of a size, delays of days waiting for castings and machinery not universal as modern

You are aware from your long acquaintance with me that I do not fly any financial Kites, or speculate, and that the works which I control are well managed — In the early days of the shops it was necessary that I should largely manage them 1st because the art was to be created 2nd because, I could get no men who were competent in such a new business, — but as soon as it were possible, I put other persons in charge.

~~why this I know in phrase with I am not competent~~

I am perfectly well aware
of the fact that my place
is in the Laboratory, but I
think you will admit that
I know how a shop should be
managed ~~also~~ & also
how to select men to
manage them —
~~With~~ This prelude I will
come to business —
My ambition is to ~~start~~ build
up a great industrial works
in the Orange Valley starting
in a small way & gradually
working up — The Laboratory
supplying the perfected inventions
~~and~~ models pattern & fitting up
necessary special machin

in the factory for each invention
~~Adoption~~ My plan
contemplates to working of only
that class of inventions which
require but small investments
for each and of a highly profitable
nature & also of that character
that the articles are only
sold to ~~trades~~ Jobbers ~~dealers~~
etc - No cumbersome inventions
like the Electric Light.
Such a works running ~~they~~ are
30 or 40 special things of so
diversified nature that the
average profit would scarcely
even be varied by competition
etc -
My plan is to form a Company
with a large authorized

40 -

Capital but all held in the treasury - to have a board directors etc — Having formed the Co & bring before it say 5 or 6 small inventions the board decides which ones they think will pay. Say 4 are selected, & Estimates are made for bldg grounds + necessary machinery to start mfg these 4 inventions. Say the costs of expanding company is 35000 + the subscriptions to the stock take 40000 at par and give me 40000 of stock — Thus of the profits 1/2 would go to the money + 1/2 to the inventor — but to insure the money. The money stock to have a 5 pct preferential div (19) if the Co earns ~~[illegible]~~ only 5 p.c.

the inventor gets nothing if it
earn 10 percent the inventor gets
5 + the money 5 - if the earnings are
20 pct the money of course gets
10 + inventor 10 -
Now this would look as if the
Co would have to earn a large
profit to yield the investors 10 pct
but if you remember that the
usual royalty paid inventors
is 15 pct on the selling price,
~~this is what I meant by~~
+ this is always added to
Cost of production + the dividends + profits
are made over + above this
you see that what is paid me
is not at the reduction in dividends
but may properly be charged
to Cost of production

Again a great number of these small inventions require scarcely any investment to inf. – $1000. invested in some special tool will turn out articles which would pay to the Co several thousand dollars a year profit –
The money would earn after paying my part. 100 to 200 pct –
When an invention by reason of competition etc fails to pay a satisfactory profit we can drop it & substitute some thing else, – ~~I would not hold myself to one line. We shall invention not that I might do well.~~

Collaboration - All inventions which the Co can manufacture derived in laboratory to go to them but any process etc not capable of being mfd to belong to E two Expenses for experimenting to be charged Co - all other ~~inventions~~ experiments to be paid by Co. - Total Expenditure Expense per year limited to $25000. without the directors decide to spend more

Inventions relating to E L W Telegraph - Telephone - phonograph - O E Milling Excepted -

I honestly believe I can
build up work in 15 or 20
years that will employ
10 to 15000 persons & yield
500 pct to the pioneer
stockholders —
I propose starting with
30@35000 ~~[illegible]~~
+ 3 or 4 small inventions,
Now Mr W do you think
~~you can~~ this practicable
if so can you help me
along with it

S

Alimentical Coating on pharo
cylinder

Perfume Base.

Shellac in Alcohol –
Syrup of Linseed oil
" " " in Benzol
" " Turpentine
" " Rhigolene –
Shellac in Benzol –
Shellac in Ether –
Collodion
Collodion diluted –
Copal in Turpentine –
Rubber in Benzol
Rubber in Rhigolene
" in Gasolene –

Solid - Perox Mang - Chlorate K linseed.
dissolved in Benzol etc

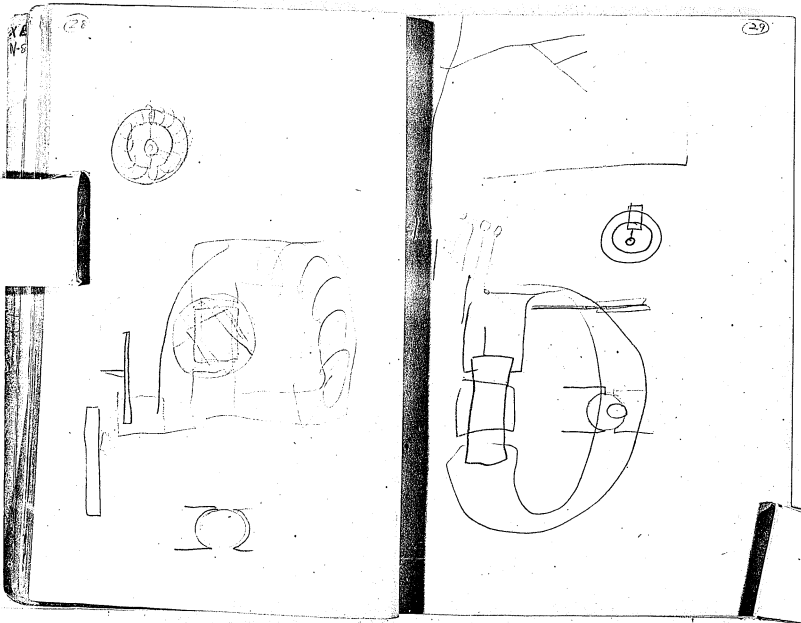
Gutta percha in Chloroform
" Bisulphide
" Benzole
" Naphtha
" Rhigolene

Gum Balata in above —

Soap Base —
Glue —
Isinglass —
Tragacanth —
Gum Gass —
Molasses & Glue dissolved in proportion.
Albumen from Blood
" " Eggs

Bases —
Spermaceti
Cohile wax
Stearic
Oleic acid

Beeswax
Tallow
Camphor
Solvent



Brass –

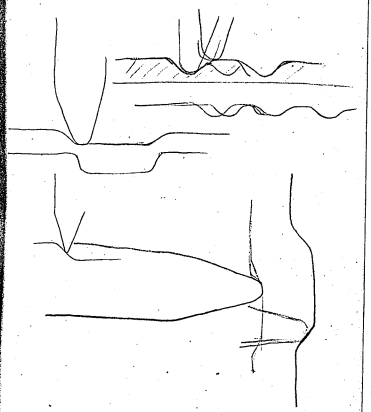
Benzoic acid white –

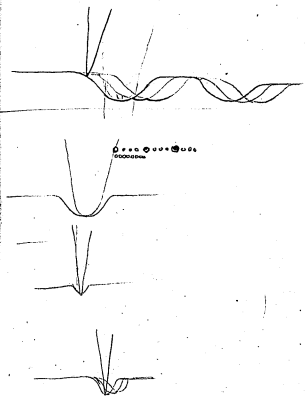
Cocoa butter german in Lump

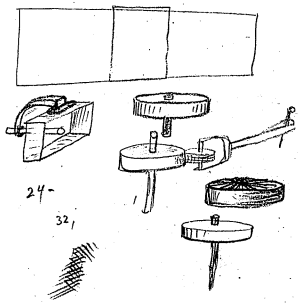
Casein – Japan wax 18c lb

Carnauba wax 22c lb

Bay Wax 30c lb






24-
32

John Ott —

New Laboratory — Nov 15 87

In rotary thermo use alloy of Arsenic + Cobalt, Mispickel Cobalt glance — Cobalt + Sulphur

See of Cobalt — Cobaltic oxide which is steel gray crystals under some conditions is a good conductor retain its other properties for thermo — for telephone, storage, etc — its use — Nitric Hcl Sulphuric Acid

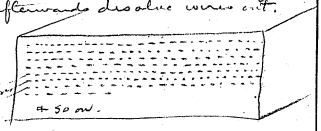
Speqitherm — for rotating thermo

(Alternate a powerful current through heated wrot + cast iron see changes —

Photographs Dr. Hopkins

For carbon forms. NOV 15 87

put wires in + press + carbonize + afterwards dissolve wires out.



Possibility of forcing out wrot iron bract to plastic Condition into pipe by Lead press lined with fire bricks + with fire brick plunger —

Make Curve of lamps for full candle power & life at 80 + 16 cp - at average points of power vacuum than we usually use — to do this perhaps a definite kind of residual gas must be used again

Nov 15 '87 (13)

the Carrying + Earth wire
Current may be too strong
at 80 to entirely virtually
result while at 16 it may
be entirely absent. There must
be a point at normal
where there can be no infinitesimal
arcs + hence C p will go up
+ life be great / Bad Vac
Lamps go up in C p +
give good life -

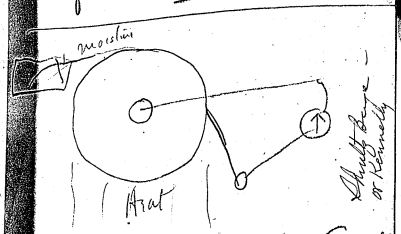
Measure the resistance of pressed
buttons under cond and pressure
+ Electrode surface of every
known oxide or compound +
their behavior for future use

Notes to Edison Mark & Work

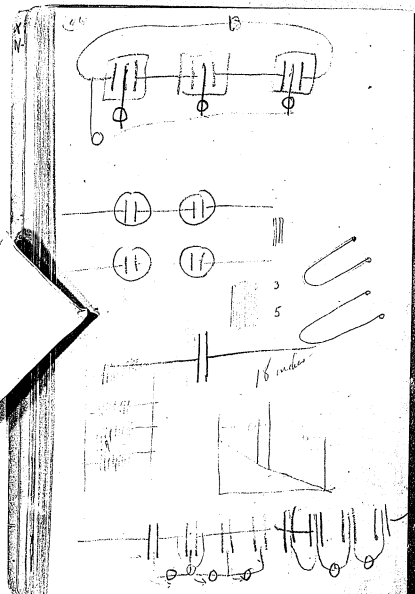
(44)

(45)

Experiment on the puffy gas hood to get a constant out hood - hold it on pressure (40 oz press) fabric of aluminia etc.



Photograph for generating Current
Heat altering Capillarity gives
Current work up - study cobby
burning BMG gives Current

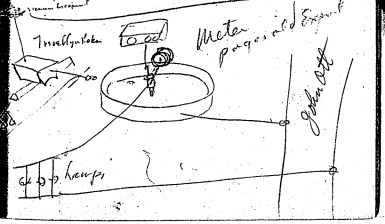


NOV 15 87

Make the Torpedo Lamp for submersion for Mud lock

Photograph through metals & other thin plates opaque to light –

Get a locking material for magnetite, that requires oil, a trace & no a flux at wed, lime water – Water & Cows, lime – Lime in Sugar – Brick Clay – Etc ?



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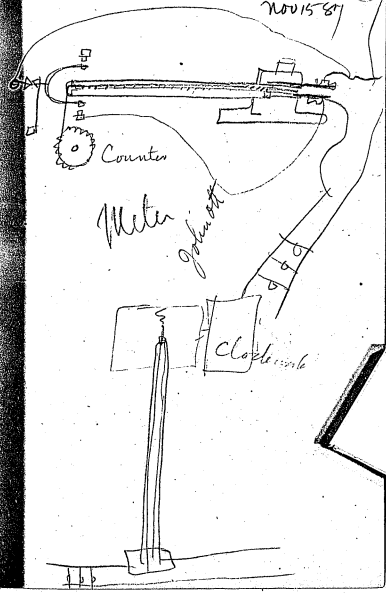
NOV 15 '87



int.

119 000
13 980
137 780

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2801 000
626,660
3,0 980
170 980

1 800 000
626660
2,25 334
240 000
149 334
119 467,20

686
3,
1878

Nov 15 '87

Use a reverser + wire in Calorometer, get heat with Constant Current + then heat when reversed – I think heat will be as great with alternating + ¼ of for insulation on break wheel as with Constant Current (ie) Orienting Molecules requires Energy which is lost in heat.

also get one of those wire heating machines same as Gellibrand had at Bost on & alternate Currents through Copper & off + hard + take breaking strain after different times.

Nov 15 '37

Deposit Silver on Muslin
Lace silk etc in Vacuum -

Study the Carbon from the action of Dehydrating agents on organic material

Deposit Chromium on glass in Vacuo -

Carbo preliminary at 300 in asphalt 3 days then bring to 600 and take out dip & run neg -

125
75
62.5
50
37.5

75
45
30
20

75
45
30
20
15

200 1.00 mop
1 to 100
100 2 to 1 50
4 to 1

Nov 15 87

Measure resistance ~~of~~ between 2 platinum wires in porcelain tube white half wires say ¼ inch apart also one platinum & carbon — probably with latter get a current.

Shelly-Berg

Try Chlorine in in lamp with paste clamp for low Vac residual — use Chlchromium — also use Cyanide Silver but only at normal so as not to damp the Cyanogen — put on U tube with Hg graduated in Millimeters —

Entered in Microbook book

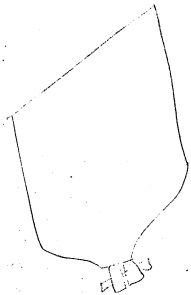
on new phonograph
Have small magnet work
the ~~and~~ Recorder at the other
End of the telegh line have a
Vibrator & break it up into dots
& dashes record this on cylinder
at speed of 300 or 400 words per minute
then put on reproducer & let
cylinder run slow to copy
out morse - Use Mimeograph
also talk over wire & record -

See if plumbago good wax
phono gram or rather
Lamp blocked will
when reproducer passes
over vary pressure & Retrograde

Hamilton

Try Experiment of sinking
well or wet some well a

OVER



Connect wire from a high to low place on Earth get dif potential, also wells – Nov 15 '87

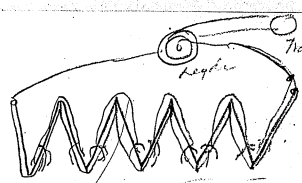
Connect tin roof to a balloon with wire to Earth get potential –

Thursday

Try heating one side of stalic Cylinder & then take off Electrification by a metal which reduces temperature back to atmos, a great variety of material can be used – by Believe Electrification by rubbing is due to heat + to a thermo pile action (10) a thermo pile of tremendous Emf – This can be got into a Current form by transformers + Condensers reducing potential to workable quantity

Friday

John Watt



Heat

Nov 15 '87

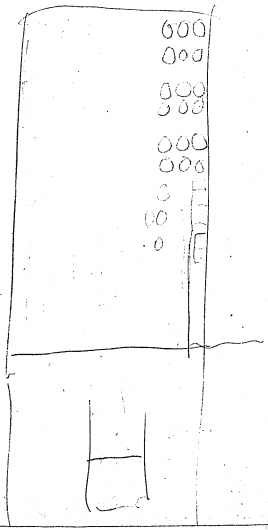
Collectors.

Try metals connected to non conductors also
The P & N non conductors which are rubbed together with collectors to take off E, Either by rubbing Contact or at distance

Nearly large

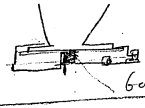
In a meter use a magnet which will have no stick like Iron reduced by H mixed with shellac - paraffin etc -

Try an induction coil and telephone with Core of paraffine + Iron Reduced by H put as much Iron in as it will stand + still be an insulator, Make grade changes of reg iron wire core + this to get Volume of sound of this works well perhaps it will work in recover -



Nov 18 87 (69)

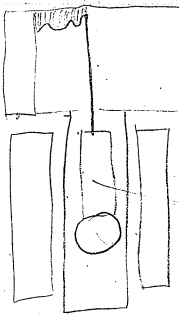
Make a Telephone transmitter with lampblack button like the recorder of phono



If induction coil with 9 row reduced by H coks - then make a transformer with core this way & also with higher melting point stuff for armature of Dynamo for High Speeds —

Try some of that non magnetic Manganese iron (they have recently discovered) in connection with Thermo Experiments

Nov 15/57



Non-pressure box in water tight bulb — lamp in water proof light & blind panel [illegible] to photo, position table — wire cloth work with [illegible] [illegible] [illegible] point pressure box

Try a telephone diaphragm of celluloid coated with phallac dissolved over with [illegible] reduced 50% [illegible] also double dia with iron powder in between,

It may be that to electrify
a piece of rubber by heat it
would be essential to radiate
it from sealing wax or
touch cold rubber with Hot
sealing wax, etc using
in some manner the two non-
Conductors which when rubbed
together give opposite E.
or two wheels one of Rubber
other of Shellac revolving
between a disk of hot water.
with Collector Leydenjar
& transformer to reduce
it to some deg of amperes
Capacity

There is something very strange that just as you go to worse & worse conductors you get higher Volts on Thermo Bis Telluri Selenium Amorp phos — if you keep going on you go to perfect insulators. (Re) better & better transforms of heat into E, but the Condens of getting a Current grows beautifully less but of right Condens (Re) induction & transform inductance you mustnot get over the bug —

There may be such a thing as polarization at the ends of magnets, hence coat over surface with various things & finally divided iron – Coat one pole also different from the other,

Shelly Rings

Kennelly

Will a galvanometer deflecting 10 degs say on one ampere give more or less in a Vacuum —

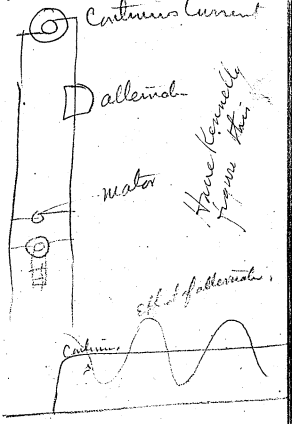
Mr. Clement

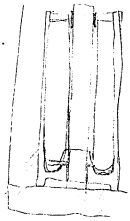
Investigate the black matter on one wire on inside part of lamp

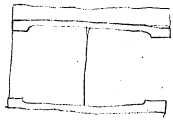
also analyse the deposit in globe

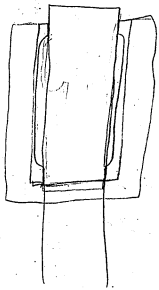
Nov 1887

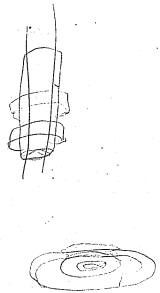
Method of using transformers + mators by alternation or transforms but one dynamo or more

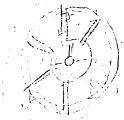


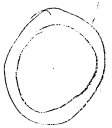


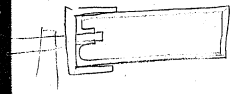


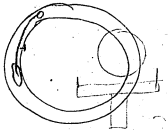




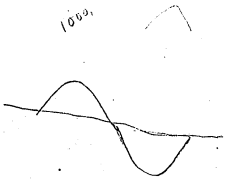






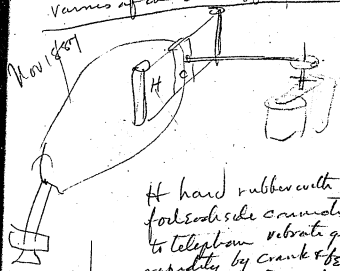


1 - 2
2 4
8 8
4 16
10 100
100 + 100 10,000
1000,



On Rubbing hard rubber it is electrified and then on passing your hand over it it isn't discharged showing that the Electrification goes to some depth (E) a double-bump stress - hence use metal plate with very very thin Solutions or varnis of the Electrifying material

Nov 18 '07



H hard rubber with foreign body connected to telephone vibrate great rapidity by crank & belt or motor to produce heat & cold & thus the original waves hear in telephone

.33 60000
19 80000
Trinity

60000 Ohm per Rod

8 rod

60 | 20000 | 33.
4000
400

2000 mm

2500 Ohm
24 cells

Nov 18/89 –

Perhaps Nickel wire goes
stroke its magnetism
greater than iron – by
it in phone & telephone
induction Coil –

Chas Ely

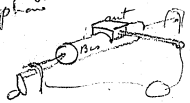
In Thermo Electric cohesion by
heat Expert perhaps we don't
want ~~Dodecitino~~ like Hard
Rubber that hold their Electricity
so long – they would be like a
permanent magnet – we want something
that will be Electrified &
discharged almost instantly

Nov 19 '07

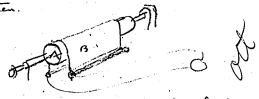
I have noticed that in vacuo it takes a very high temperature to decompose cyanogen, also that in low vac lamp the Cp goes up - now as there is certainly arcs going on with filament even at normal these arcs must have sufficiently high temp to decompose cyanogen & yet the main body has too low a temp to do so - hence by using Cyanide of Silver in side tube & getting high vac working lamp up in any way ready to cool the Silver salt may be heated & enough Cyanogen driven off to bring the vac down to the point required using a U shaped gauge or a spark of the latter dont decompose too much Cyanogen or produce other bad results - Thus of lamps set up at normal most arcs be prevented by low vac & those do occur will be stopped by deposit of carbon from decomp of Cy.

Nov 19 87

If we rotate a bismuth cylinder with a fixed Ambrony rubber we get a constant current as shown by my experiment with rubbing Ulbar Cogitchen & listening to telephone



Now if friction E is a thermo electric action then.



having two metals A which is shellac very thin or other varnish like Collodion & B a sheet to give great surface as Microfarad Capacity ~~the~~ stabilized not as a thermopile cadmium & be constantly charged up as a current.

Dry
according to Faraday heat Oxalate of Calcium strong by platinum or glass becomes positively electrified in a powerful degree

political it may be lifted at office desk
Nov 19 '87

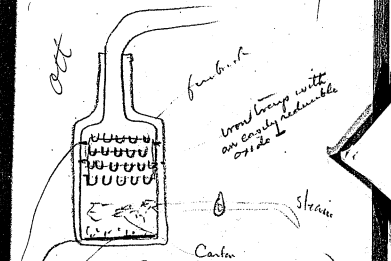
Erdman states (Sullivan Archives of Ex. 480) that if any thermo pile be rubbed at its junction it gives a current that it cannot be due to heat as it commences instantly & ceases instantly the friction commences & stops — this is very important if true — an other support in Watt article on E & confirms this

May it not be probable that more Energy can be (wasted) when a thermo junction is rising & falling in temperature than when it is kept at constant temperature higher than the other junction — this is as in pyroelectricity of Crystals, no electrification while temp. constant but only shows in our rising & falling temp —

a cold wire (same metal) touching for an instant a hot wire gives momentary current,

good?

Nov 19/97



The flame conducts anode

Melluccci says combustion Charcoal in pure O gives H2O E but with H2O Charcoal plate charged with Neg E & Carbonic Oxide or anhydride to Pos E In above the steam is decomposed by hot carbon which takes from Neg & CO_2 reason is not known by the oxide to CO + the flame go in good anode

Nov 19 87

Iron pyrites are good compounds
heat in ore mixture use heavy
amperes & pack 3 or 4 oz lb in
glass chemical tube with and closed
put on pressure & send current to
roast —

Electric Roasting

Try roasting neg way test in
lump. Think twill pulverize
easier —

Edison

Study the repulsion of a
flame by a magnet.

Chemical Magazine

Monosulphide of Carbon
is a maroon colored powder
stable but decomp at 200°
into its elements, this
might be good as the sulphur
would take out the mercury
+ not attack the plate was

Nov 19 87

Why should not Iodide of Carbonate of Aluminum heated to intense Heat in a Vac be dissociated + give the metal - there being no oxygen present,

Marshall

See 3rd Supplement Watts page 1746

Colophthalin = a Hydrocarbon $C_{10}H_6O_2$

Chemical Manufacturer Editorial

Resembles Alumina - its infusible - non volatile & not Decomp by Nitric or Chloric at 1000 Centigrade -

Nov 19 '87

I believe all chemical Elements which give more than one line in the Spectrum are like the Hydrocarbon series for instance we have the General paraffinic – Coby showed there not be a general Hydrogen of three lines of H then there are 3 series of H Each differentially arranged I think for instance that, take an oxide of a metal that gives widely spaced lines say 4 lines that by means of solvents if the oxide could be separated pretty fairly into 4 gradations of oxides – Each showed gave one particular line brighter than the other. Shaded lines are simply oxides with slight changes only.

Carbonize Elder pith - Corks - other light matter to get a finely divided Elect powder to charcoal for Dump filament by squirting

Balsam

See if pure anthracene will mix & harden paraffine with Carnauba - or leave out Carnauba

Hardener

Try the Experiment of putting Crude anthracene in High Vac & Volatilizing see if commercial & examine residue

Edison

Chem Dept

Distill hardest paraffine until the highest boiling point paraffine is left

Nov 19 '89 (107)

Phenylnapthal-carbazol $C_{16}H_{11}N$ fuses at 330 c + has a higher boiling point than Sulphur —

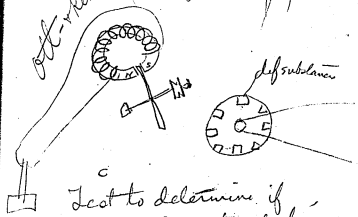
Chemist

Crude Anthracene contains all the higher melting point HCarbons - by sublimming in a vac probably or boiling in open air & did probably get a residue that would be good for filaments. —

Mr Lamp Experts (with dig deg vac to see effect on Prop Cp - make 20 Lamps ~~[illegible]~~ 320 cp hp - of each deg pressure & see up at normal use Cyanogen as a residue

Mr Mackie

Nov 19/97



Test to determine if anything will set and lines of force

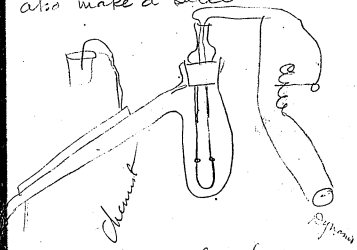
Experiment on the effect of changing of rotation of metallic conductor in magnetic fields

as platinum readily amalgamates when Hg is allowed to run into a Vacuum. I think it probable that clean object iron in Vacuo can be beautifully Coated with tin by deposit in Vacuum with arc & allowing half tin to run in —

investigate the outbursts produced by heating the filament when the CoBa has a mixture of Naphthalene & paraffine in it — it seems to have tremendous high melting point & the most dazzling fluorescence ~~[illegible]~~ by burning of fluorescence

Nov 19/87

also make a still thus



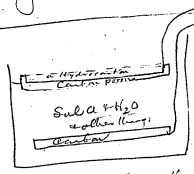
Try different Hydrocarbons etc =

Try if Roasted auriferous pyrites mixed with carbon & salt water & left to itself in warm place will entirely decomposed —

Nov 19/09

Monkey with 2 amp current under various conditions through sulphid — to see if H2S could be conducting as a transformation

Beside X



Lifter

The Hydrocarbon is the Cementation

Gallein or Gallin carbonyl but without change.

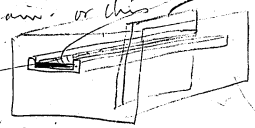
Chem. Abs. Jan

Nov 19 89

Plaster paris mixed with H_2O containing some Potassium Sulphate — in Molecular proportions when mixed returned it hardens before it can be poured —

— Cream Tartar also quicken —

Try the Carbon Rod in a very narrow porous cup with tellurium rubbed on it. The H combines to form (tellurides) H + on contact with air decomp & Metallic Tellurium falls back to be used again & again. or this



Put powdered Tellurium on top Carbon

(110)

Nov 1987 (110)

in Watts Dic 1895 - 2nd Supplement
p 638 - speaks of decomp of
Bisulphide Carbon by heated
platinum Spiral C - with
decomposition ~~with~~ into Carbon & Sulphur
also ~~page 657~~

Watts 2nd Sup p 722
Hydracrylamic acid - Sol
water on heating to 170 C
turns brown sublimes along
in feathery needles at higher
temperature & decomp completely
forming a very difficultly
Combustible charcoal

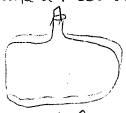
Clem-McCaddon

Nov 20/87

Idea for a steam Engine -
Use two boilers - one containing
~~tub~~ say sulphate of Copper
in powder - ~~[illegible]~~
heat this with fire to dehydrate
& make steam - & to make
feed water to 2nd boiler -
use it in Engine & then exhaust
into the dehydrated sulphate
in other words procure & also
condense your water from a
substance like Sulphate Copper
utilizing the heat of all the
reaction.

Fill large boiler with several tons
of Cocoanut charcoal, allow it
to absorb a dry gas or than
Close & heat the absorbent pressure
to work Engine. Thus we can
Condense Atmosphere air to
a ~~solid~~ liquid almost

Make a vacuous glass box



boil it in hot Linseed oil while Exhausting use McLeod Gauge + run from 7 am till 6 pm — highest obtainable Vacuum — Then change into beaker on stopcock on heating lines of glass or Stand etc. of glass

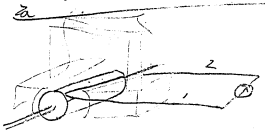
Repeat

With spectrum tube end on and order heating tube — get Spectrum by gently heating say Iodide Iodine — Record Spectrum. Then heat little more get record Spectrum — then so on until all the Iodine is driven off

Iodine

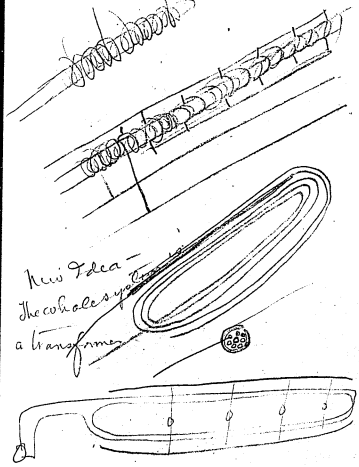
my idea is that Iodine is a mixture of Iodine Molecules. + spectrum will change as higher heats are used to decompose the compound — 1869 magnet to end

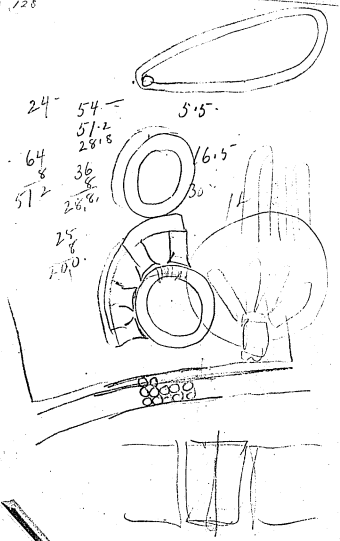
It may be necessary to put the tube in a metallic heated bath & use a thermometer the different discussions points of this work with Iodine, Chlorine, Bromine, Try it with Hydrogen & use Phi Cadmium & get spectrum at several Exhaustions & temperatures, ~~also use~~



Use Hard rubber cylinder rotated in [illegible] Reading on top is a rubbing wire with 2 reading wires — my idea is the rubber will be charged & will induce a current through wire 1 + 2

Nov 22 8

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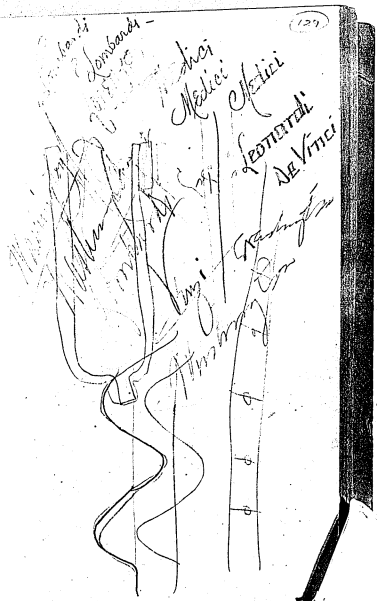
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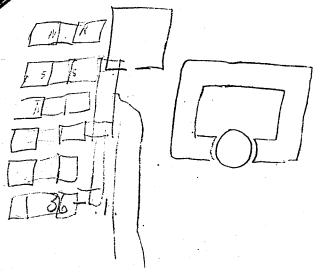
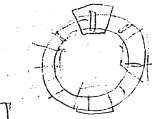
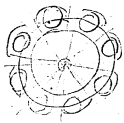
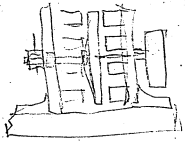
DA VINCI









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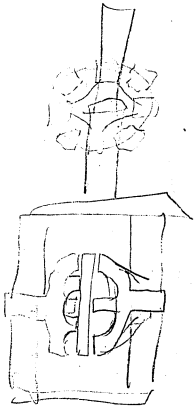

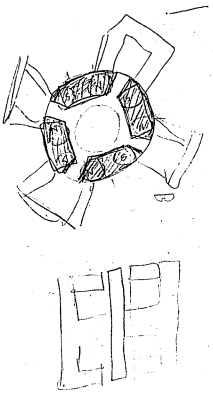

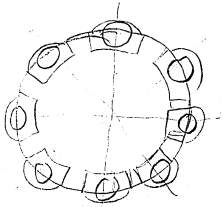

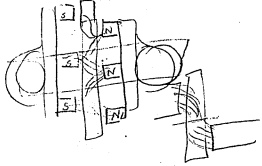
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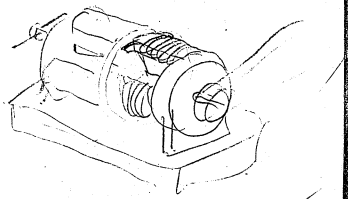

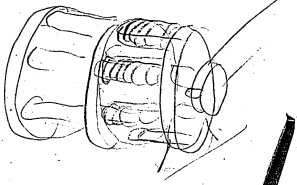

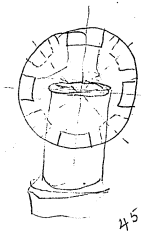

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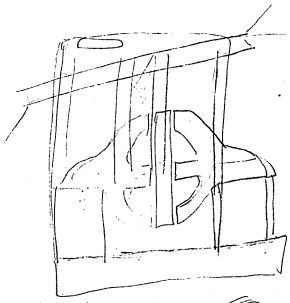

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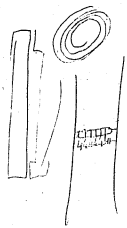

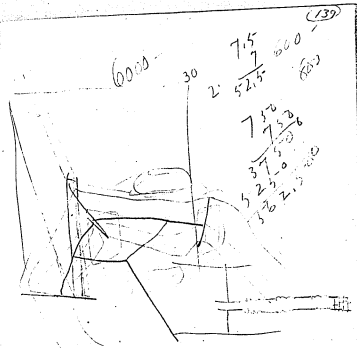
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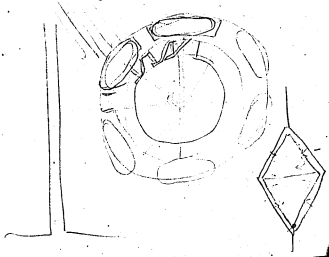


Time Experiment —

Put in Large bottle, a sheet of every kind of metal seperated from each other + then fill with Bisulphide Carbon

Chemist

also — For Chloride of Carbon another bottle also Chloride of Carbon Let these 2 bottles away sealed for several years to see if Diamonds formed by decomp & crystallizing for get some Iodide Carbon also —

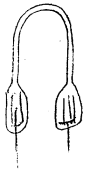
Watts says in some experiments on
spectra of Carbon that with spark
tubes no deposit of Carbon takes
place with diminished pressures
but at pressure atmospheric
sparks which deposit carbon are
free — I think that
Carbon filts could be deposited
upon a dull red if in a
Hydrocarbon vapor under
5 or 6 atmospheric
pressure —

In Electrolytic experiments
for the Concentration
of various chemicals
Note that any neutral substance
liquid can be decomposed by great
pressure small quantities of hydrogen

Schonbein says that all peroxides formed electrolytically are formed by ozone — Especially silver — Marshall to work this up — Chemical News

Welsbach hood replaced by falling Zirconium powder.

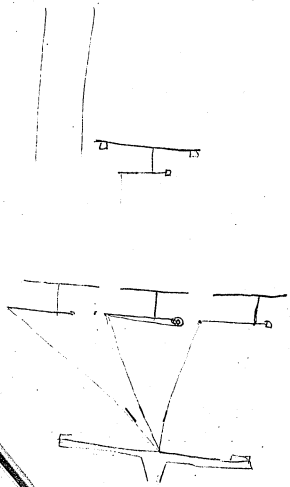
perhaps under proper conditions the powder (very light) on an inclined (fed) base at bottom of flame may be drawn up through flame & fall back tangentially with a chimney a whirl operated by the heat could be arranged to do mechanical work. Stuff would be pros. combustible like oxide — Work this & chimney



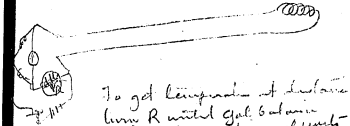
Bohemian glass that will stand yellow heat with Capillary bore filled with dry gas ~~[illegible]~~ & thoroughly with sharp current, also bore filled with fluffy Earthy Oxides.

Marshall ~~Typo [illegible]~~ Try some Nitrogen Hydrides in Vac. The heating of filament probably produce a good residual & deposit

Column to name that community



Eliminator



To get temperature at instants
turn R until gal. balance
Read off Temp in terms of weight
of Change of Resistance

Phonograph Nov 25 87

Tel

Hard rubber cylinder polished
Record by a rubber point vibrations
were a strength of [illegible]
on surface represents vibrations
amplitude - use a delicate
[illegible] of
picture to the Electro-magnet
attraction dont seem to work
well on [illegible] Exp[illegible]

for duplicating photographs. Coat paper with photographic emulsion dissolve phosphorus ~~[illegible]~~ very minute amount in $BiSulC$ or ether dip cylinder in then at moment solvent has evaporated dip in Sulphate Nitrate Silver - [illegible]

In compounded preliminary use 1/017
well dried and pulverized rod 10g –
The crystals in H_2O – Dextrose, Caramel,
Hard burnt sugar – Grape sugar – Milk
sugar – Saccharine – albumen – blood +
egg – Catechin –

Mix with 17 some photograph or plumbago –
also after put on dust over with
dry burnish with brush –

Also after treatment with 17 + formal
Carbon put on gas tube with hydrogen
+ deposit on

Instead 17 – dissolve the
Hard Cubrum in hot dimond +
then let it dry by air – 6 days
before sending to formal –

Chemist Marshall Rutland — also Marshall

Silver carbamide when heated (157)
gives off Ammonia —

Iodide Carbon — Tetrachloride
carbon necessary to make it — Iodide
carbon decomposes slowly at ordinary
temperature but more rapidly at
200 fahr when exposed to air
into $CO + CO_2$

Monosulphide Carbon a powder
decomp by heat at 200 Cent
its made by exposing Disulphide
to strong sunlight — also by
putting lot iron wire in sealed
tube with Disulphide for 6 weeks
See Watts — 3rd Supplement Pt 1
P 406 —

Chem — Marshall

Tri Bromide of Silicon — is in crystals
which sublime at 240° C
This is good for depositing in platinum
See Watts 2nd Supp p 1086

Watts 2nd Supp p. 1215 –

Bromide of Zirconium – $ZrBr_4$ –
Volatile at heat of gas burner
good for depositing on
filaments —

Iodide Silicon Tetriodide –
melt at 120° C boils 200° C
Sesquiiodide – melts 250° C

Ammonia-chloride Boron.
$3NH_3\ 2BCl_3$ This may
be compound —

Chem. Mon. Bd. 22 S. 1

On 17 mix chloride Platinum - also chloride - also scale in chloride first then dry - there 17 of them to fill gaps by a good counter / to make good contrast in a circle -

Idea for photography red or heat end of spectrum

Coat a plate with material which at ordinary temperature decompose but does not below zero - Now absorption of heat rays will raise temperature on certain points up to combining point & thus photograph lines of spectra

(163)

Carbolate of ammonia — for heating in Vac Exports —
Carbolates of Baryta Lime & Earthy Salts having no water should decomp & give vacuum HydroChloric —

Picramic acid for a 1017 —
Chlorine passed thro aniline oil gives a Jan green for a 17

Cyanilene —

Curious — on heating Cyanide of Iodine it gives off Cyanogen & leaves paracyanide blue which is a very porous very reproducing mass which when struck with hammer or grind appears like Bismuth perfectly metallic appearance try for Thermo — Telephone — etc —

Charcoal

The paracyanide of silver combines with Hg to form an extremely hard crystalline amalgam

Azulmic acid is an intimate nitrogen compound of carbon I work at it for a basis for file work

Charcoal

Comenic acid - by manipulation gives a charcoal like glance Coal - ammonia distillation of Coal - See Gmelin Organic Vol V p 384 also Comenate ammonia

Charcoal

I think for life the destructive distillation of various organic compound just short of carbonization will give me a great number for instance Citric acid by heating at a certain point turns black as a little further gives an extremely lustrous Charcoal

Organic Chemistry

by stopping short of Carbonization
Salients could be generally
found for all resolutions & this
a large number of 17s can
be obtained —

See if it is possible to
Carbonize Hair in asphalt
Linseed oil — Chloride Zinc
etc not only hair but
put a piece of any kind
animal matter, Silk hair
hair - albumen glue gelatin
aniline crystals etc.
use slowly rising heat in Porcelain chamber —

Organic Chemistry

Mucic acid on carbonization
leaves a charcoal with
an almost metallic lustre,
Gmelin V p 503 —

Saccharic acid – Desiccation

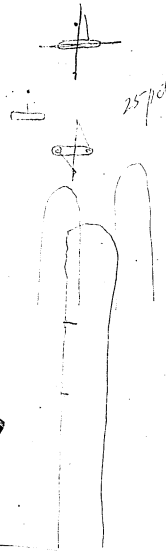
After preliminary $+H_2O$ driven off so there is scarcely any O left it might be acted on by Chlorine at the same temperature as it was prepared at so as to take the H out without forming Hydrocarbons + thus preserving porosity — good 2.5/5

Eldon

Post-Chlorine

Mary Marshall
Mrs. Chas. Marshall

Anhydrous Phosphoric acid is especially valuable for dehydrizing filiments as it doesnt part with its O – like SO_4 + Carbonize – This is so good point boil fuls in F. phos acid



All Nitrogenized organic compounds when treated with excess aqueous fused alkalies in manner indicated by their peculiar nature give off all their nitrogen as NH_3. 2 atoms H_2O take their place hence if this is so have hom etc. Boiled with an alkali etc. should offer [illegible] of Carb-oxylic [illegible] or proffering

Carb Lime decomp at red heat in air will stand melting [illegible] a closed chamber when it is under pressure hence in any vacuum compounds [illegible] probably [illegible] Wheelcimp at 6 [illegible] other [illegible]

See Watts Dic 2nd Supplement
p 265 Pentacarbon Disulphide
a solid & Gleek Chem Manual

Have a continuous transformer
drawn out & made on basis
of a 10 ampere machine with
double armature velocity & thus plates
inclosed in iron box to get two
poles - box forming point field poles
1000 Volts pressure - big diameter
armature short length, wire up to
saturation of core - put in
Centers of pressure, agate of pressure
perfectly balanced

also larger one with more iron
boxes and feeders running iron
down pole values to bring down
in manhole - use 3 wires or
constant transformer - without core
put motor armature horizontal so
gets iron in old vertical poles
Centers -

artificial filts — Edison

Carbon bacco — First to be used to form a frame to prevent easily fusible carbonizing substances from running such as asphalt the amount of carbon being small in proportion to the fusible carbonable material 2 Second where the greater percentage of the whole is carbon the fusible material being used only to lock the particles together

Carbon to be very finely divided like Electrotypers or rather like photographic plumbago —

1 : Carbonized coke
2 " Pitch
3 " Cocoanut shell
4 Carbonized Cotton,
5 " " bamboo filaments ground up
6 Lampblack "Eddys"
7 Telephone lampblack
8 Carbonized residue from Standard oil relas

9 Carbonized asphalt.
10 " Sugar
11 " Albumen
12 " Tragacanth

Edison

13 Carbon from action of SO_2 on various organic material - Sugar - Dextrin, paper, Cotton, Milk sugar - anilines, Oils -
14 Carbon from action Chlor. & Zinc on above organic materials.
15 From pine wood charcoal.
16 Tartaric, Citric, Oxalic, other organic acids Carbonized also form Tannin, pyrogallic ~~[illegible]~~

Material which is to form principle part of the fil 1st series -

1 Hard Cubian asphalt, in liquid with Carbon mixed as about evaporated, - preliminary preliminary pg. 17
2 Hard Cubian with Carbon 4 - 20 pct Naphthaline to give more mass & worked hot - preliminary & dupd. 17

3 Hard C. + Coal tar
4 " Pitch of Coal tar
5 " " Wood pitch,

I will only mention now materials to be got together as I can then work out proportion

to suit results on Squirrels —

All the Cinchonines —
gum Bistum.
" Arabec
" Thebine —
all the other gums —
glue albumen — Isinglass
Usipian asphalt. Anthracite & bituminous
Petroleum Jan — Petroleum Pitch
Linseed oil, Castor oil — Olive oil Cotton oil
glycerine — ~~Mucic acid~~ ~~Comenic acid~~
Mucic acid, Comenic acid,
Hydrocoxylamus acid — anthracin
Cinko — Coloplthalin see watts 2nd sup page 1746 — infusible non-volatile
Hydrocarbon —

Monosulphide Carbon — decomposed at 200 C

a great many Hydrocarbons pyrene etc
as Carboxylic acid — get thro formic
Carbon —

Clement Monstatt

Notes Continued

Phlorizein ~~draft~~ Gmelin p 17 Vol X

$C_{42}H_{32}O_{26}$ – infusible carbonizes without fusion or volatilization

Rubian – Gmelin X p 35 – dissolves, leaves much charcoal

ditto Rubianin p 56. X.

Chlororubedan ditto X 62 Gmelin

Convolvulin – Gmelin X 154 – melts at 100 – can be drawn out into dazzling white threads, no ppt. Mother pearl

Cyclamin – Gmelin X 200

Carbonizes without melting

Carthamin ditto – good!!

Gmelin X 202 !!

Leaves ~~[illegible]~~ Charcoal

Other Monthly

Haematoxylin only chars volume
large quantity humour of
Smedley X 285.

Fat or wax of olive Smedley X 290
chars & carbonizes ~~fat~~ Enter this in Chem III

Retine a HC for phenolism
hardener

Paraceyanderivatives
melted & then slow
dissolving out leave a
frame work of carbon

John Macdonald

Bi-hydro sulphate of Cyanogen
fuses & Carbonizes leaves large
bulk charcoal —

Hydrocyanate of Titanic Chloride
passed its vapor through Red
hot tubes deposits that ~~[illegible]~~
Copper colored Nitride of Titanium
gives Carbon filaments — Gmelin
Vol
II — 148 —

Sulphide Stibine Carbonizes
it is a powder which sublimes at
80 when heated above it
becomes transparent then is
sublimed straight to gas
Gmelin Vol 6 169

Saliretin Vol 6 231
Carbonizes great quantity
Charcoal

Vol 6 Gmelin p 262

Sulphanesolide –
Works when carefully heated but ~~salutifer at a higher temperature~~ ? ? ?

Salicylamide Vol 6 p 345

Erythroglucin was a good – Vol 6 Gmelin p 385 – 17

Chemical

Japonic acid (Dead black) Maywood well form 17
Vol 6 394 –

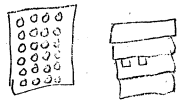
Mellitic acid This is a dozen for fermentation Vol 4 Gmelin p 1

Vol 4 — p 16 —

Paramide - clay like - carbon
~~without~~ melts

Vol 4 p 252 Creatine
very difficult finish diamond

Have John Ott make
some ~~one~~ inch ~~square~~
slabs of Carbon with holes
thru



John Ott

Scratch no on each hole
which is 1/2 dia by 1/2 deep
weigh out equal quantity of
holding Carbon pible + then
Carbon + stand + heat the Chem
to quantity Shake + combustibility

(192)

(1) (1.5) (2) 2.5 3. 3.5 4

III I I II I

27000
9000
5000

(193)

Run off 20 min. hamps get high vac & seal without heating fil then set up at 240 c.p. h.p. & take C.p. regular

Moreland

Mellers Inorganic p 555

Cerium metal easily obtained by electrolysis. Easily drawn in wire - etc. Make 10 lbs metal.

Clement

Chromium requires higher temp than platinit to melt

Chromic fluoride. Chromic is a gas formed by mixing 4 pts chromic acid 3 pts fluorspar & strong SO_4H_2 blood red gas — deposit on fil

Mellers Inorganic 694

Moreland

(176)

(175)

~~also in Mellor p 677~~

Pentachloride of Molybdenum
Melts 381 Fahr gives dark
brown vapor — good for deposit
on feb — Miller Manganese
p 711.

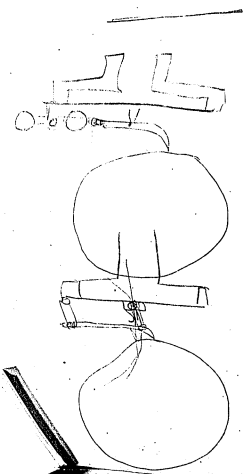
Tungstic Hexachloride
Melts at 527 Fahr & boils
656 — gives vapor —
Miller 715 —

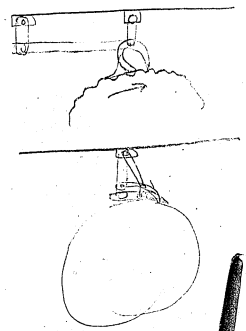
Tungstic Pentachloride
Melt at 478 Fahr

Show Mixed
Oxides by
fusion with
Borax

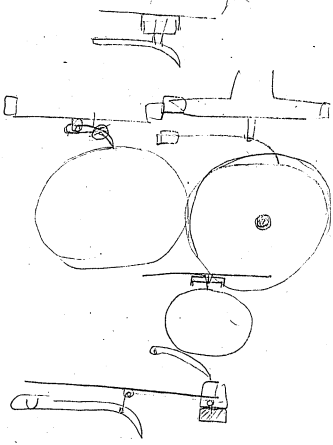
Try the Experiment in a Lamp with Red Oxide Hg — also Perox Lead to see if pure dry Oxygen allowable for filament

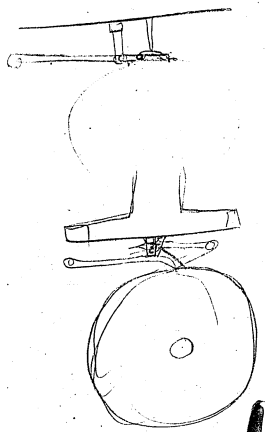
Osmic Tetroxide is volatile, with very Osmium will probably be deposited and so most infusible element known except Carbon

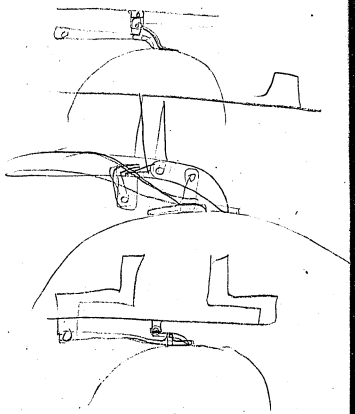


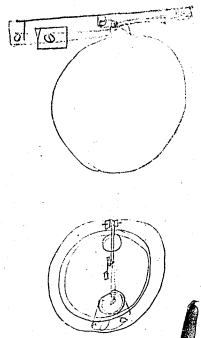


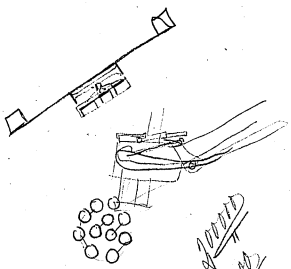
Sept 3 1888 phonograph



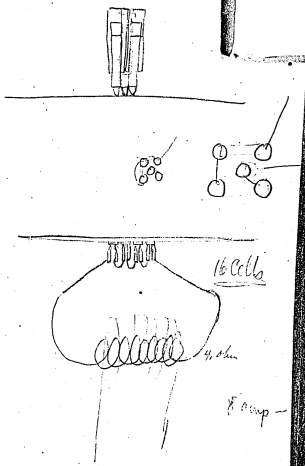


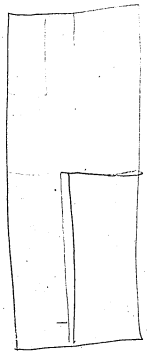






12
17
84
12
204





213

(214)

3266.
266
532.

2 | 2000 amp
pair — 1000 hp —

2 pair

4400 | 1000
44000000
33000
11000
9900
1100

33000 / 1000. (133

16 | 2000
16
40
32
80

20

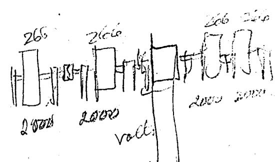
15 | 2000 | (133

4400 | 4000
35200000
33000000
2200000 (106

33000 | 133.

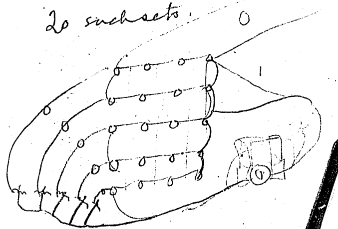
(215)

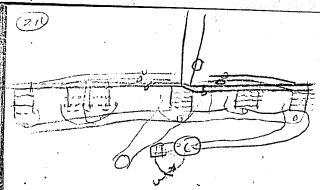
20 pair of 2 coil 2000 amp machines or 266 hp Coupled together & then Coupled

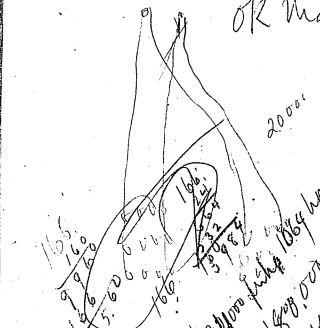


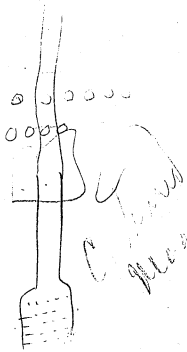
1060 horsepower

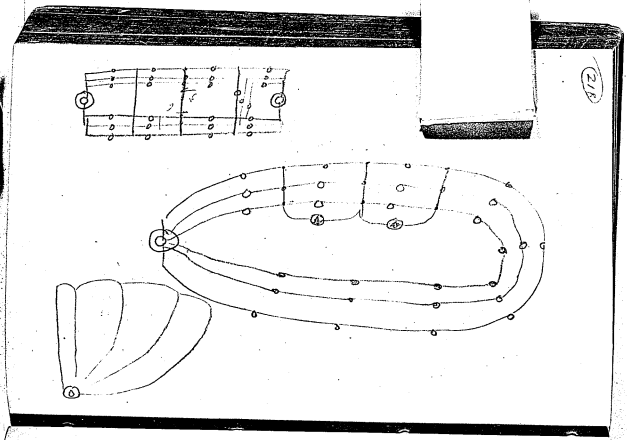
20 such sets.

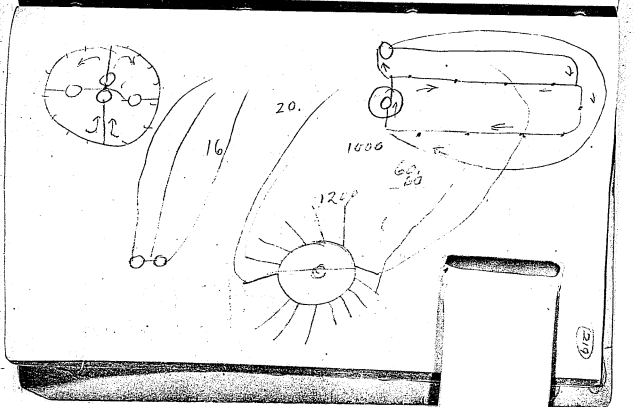


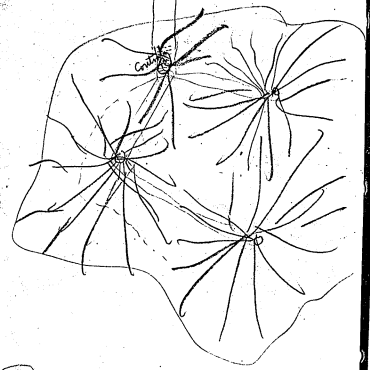


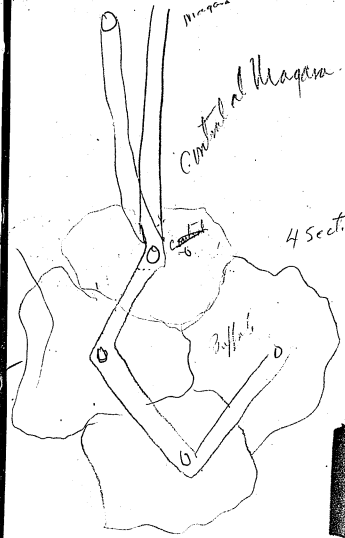

OK Magara
20000
165.
160
166.
165.60
166.
1064 hp
$29600.00 fr






20.
16
1000
1200


Centre


Niagara
Centre of Niagara
4 Sections.
Centre
Buffalo

drop in volts divided by
the current in amperes
gives the total resistance

1 circ mil foot has 1.0 ohm R
1 " " 3
1,000,000. lb

2343 | 10000 | 4.27 333 000
9372
280

10 0000
9372
628
ohms 6280
15940

18
5000
90,0000

6400 volts

1280 volts

1000 | 6400 | 2 343 amp

2 343 | 1280000. | .5476
11715
10850
9372
14780

2343 | 16000 | 6.83 | 6400
14 | 81600

7½ amp 1 horse power 100 volts

7.5
2 0000
150 0000

7.50 | 20.00 | 2.66
75 00
5 00
4 50
50

7 amperes 100 volts
1 hp

5 | 8000.
1600 volts drop
5 | 6400
1280

44
7
308
100
3080

44
8
35.2

44
.750
220
308
33 000

3 volts lost

2 | 375.00
187.50

268
804

1 000	150 000.	
200	75 000	
400	37 500	
800	18 750	
1600	9 375	
3200	4 687	
6400	2.343	

2 | 9375
4687

1 cm	900 000 ohm
2	450 000
4	225 000
8	112 500
16	56 250
32	28 125
64	14 062
128	7.031
256	3.516
512	1.758
1024	.879
2048	.440
4096	.220
8192	.110
16384	.55
32768	27.5
65536	13.75
131072	6.87
262144	3.435
524288	1.717
1048576	.8581
2097152	.4291

4.29 | 12.75 / 6.87 / 3.435 / 1.717 / .8581

2 | 6.87 / 3.435 / 1.717 / .8581

2 | 3.435 / 1.717 / .8581

2 | 1.717 / .8581

2 | .8581 / .429

1000 volts
drop in 6400 -
2343 amps

18 17
6 6
4 2

20000 7
62 | 140 000 (2254
124 0
164
160
300
350

3 | 2.096976
698992

2254
62
4 50
4 20
13 30
13 9
1

698992 lb
17 cents/lb

48929 44
69899 2
178828 64
6 100

$ 178,828.64

$ 118,828.64
16 pct drop
Earth return

Instead of 4 dynamos
of 2000 Each use 6000
Volts, & 2 dynamos
of 300 Volts Each —
or 40 double dynamos
of 500 hp Each pair at
$24 per hp including 17 pct loss.
$12000. per pair 40 pair
$480000 — total, Rope Driving 300 per pair
$20000 — ~~found~~ station
appurtenances, extra dynamos
Regulators $35000.
Total without building
at Niagara $535000.

900000
80 | 90000 | 1125
80000
10000
99600

Poles 2 sets.
80 feet apart or
1125 — or double 2250 60 $60 each
135,000

5 miles under ground high main
at $5. per foot. 130,000

40 double high Motors
5760 480,000 — 6 Volts. 20000.
2880
13440 Double low Dynamos
480,000 — with bldgs etc
Regulating apparatus bldg
etc 35000 — Total
at Buffalo 480000
480000
55000
1015000

Niagara

8.5
$4\frac{1}{4}$

2.9

25000
24
10000
30000
60000
1000000

80 feet. 1 inch — 240 lbs strain
166.10 — 333 comfortable.

500 25000
10000
62500 | 2000000 (32
187500
2500000

500 500
25000

25000
2500
2500
3000
6500

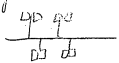
Total.

Niagara	535000
~~East~~ poles	135000
Wire	118000
5 miles underground	130,000
Double Offset Bra	1,015 500
	1,933 500

~~Total~~
~~Pos 1 inch Cop~~ ro

two 1 inch rods —
or 8 1/2 inch
32 $\frac{1}{4}$ inches wires last
practicable.

Bldgs. ~~60~~ 4 double dynamo



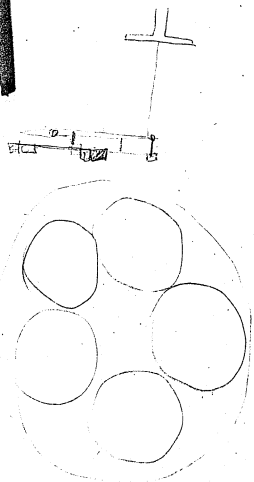
50 ft wide – 24 feet each dynamo on side or
20 - space 24 ft wide. or 6 bldgs
500 feet long – Cost. 35000. without
foundations for Dynamo say 25000
for foundation make off 60,000.

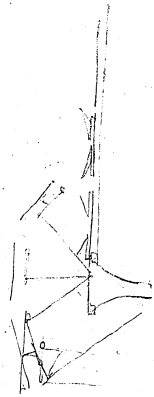
at Buffalo. with 3 stations,
Cost stations. with ~~45~~ motor + ~~60~~ 45 dynamo
dynamo repairs, Dynamo with motor
below. Space for ~~45~~ double dynamo
or 15 in each station. Bldg 25 X 100
answer. Cost, with next estate.
35000 Each total 100 000,

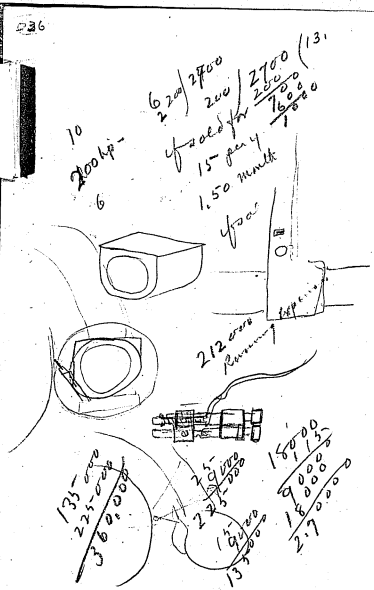
These items added to the
1, 933000 – with 5 Extra HYD
60 000
100 000
60 000
2 093 000

Total 2,153,000.
75-000 Labor unloading
Grand Total 2,228,000

Dispen st. 3 pet say	67000.
3 monitors on 1,500,000 at 7%	11 250
Dry Dock at Niagara – 4 placers – Superintd	36 000.
	4 900
	45 500
at Buffalo.	6000
General Manager –	8000
Treasr. –	5000
Secy & Treasurer	4000
Electrician at Bu –	4000
" Niagara	
Repair machine,	3600.
~~Motor~~ ~~Gen~~, on 600,	20.000.
Bearings. ~~[illegible]~~	25-00
Waste	2800
Brushes ~~[illegible]~~ 600 per yr	18000.
Repairs & Operations –	
112	212 5 5 0







Niagara

Running Expenses 212 hours delivering 18000 horsepower net.

If sold 10 hours daily at an average of 15 dollars per year per hp — net 2.700,000 deducting Expenses & add

Total investment 350 000 for power works, The Customers furnishing their own motors

The total investment is

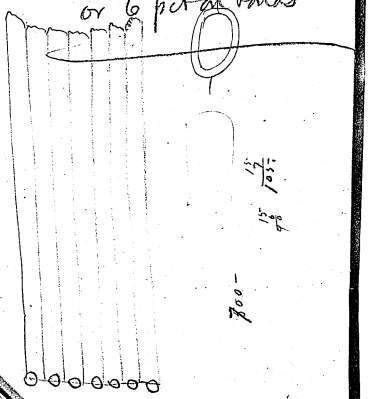
2,228 000
350 000
2.578 000

Recpts 270 000
Running Expenses 212 000
57,000

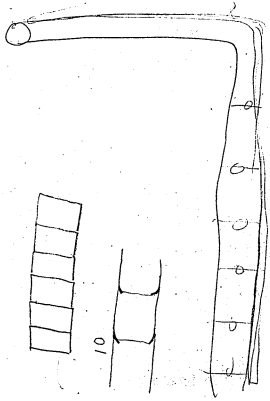
If 9000 sold to large Customers at 15 & 9000 for 250

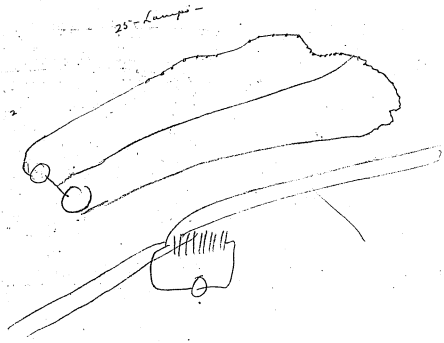
Then we have 360 000 Reps
212 000 Exp
148,000

or 6 petal bands —



Triple

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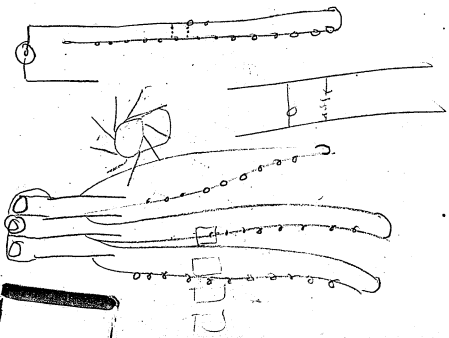

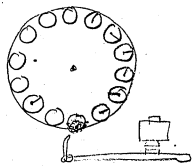

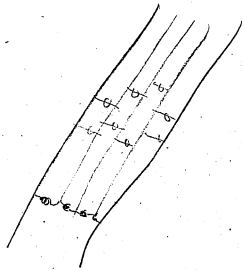

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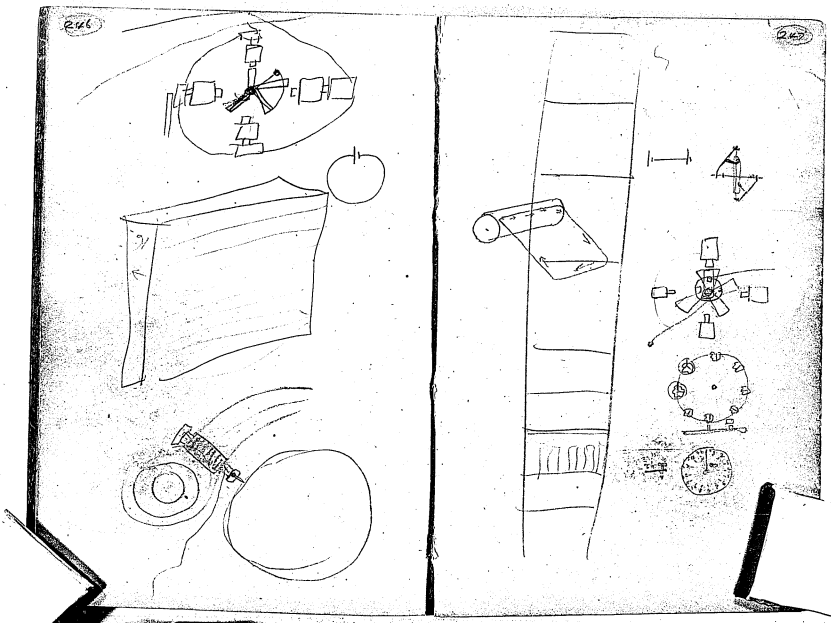
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